AD-A144 237 ADA (TRADEMARK) TRAINING CURRICULUM INTRODUCTION TO SOFTWARE ENGINEERING M102 TEACHER'S GUIDE EXERCISES(U) SOFTECH INC WALTHAM MA MAY 84 DAAB07-83-C-K514 1/2

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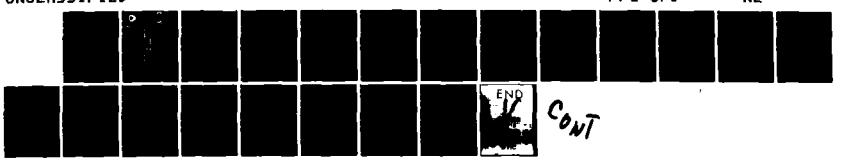

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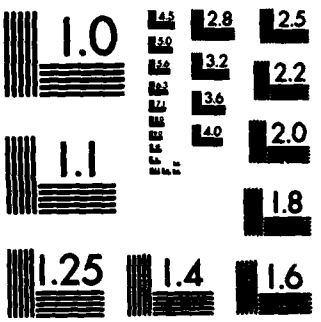

MICROCOPY RESOLUTION TEST CHART
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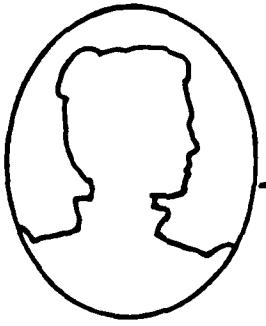

Ada® Training Curriculum

MAY 1984

Introduction To Software Engineering
M102
Teacher's Guide
Exercises

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AUG 14 1984
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Center For Tactical Computer Systems
(CENTACS)

U.S. Army Communications-Electronics Command
(CECOM)

Contract DAAB07-83-C-K514

Prepared By:

SOFTECH, INC.
460 Totten Pond Road
Waltham, MA 02154

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M102 - EXERCISE
INSTRUCTOR'S GUIDE

PURPOSE:

THE EXERCISE IS DESIGNED TO ILLUSTRATE THE USE OF THE ENGINEERING GOALS AND PRINCIPLES THAT WE HAVE BEEN DISCUSSING.

THE CLASS IS SPLIT INTO FOUR GROUPS: THREE WITH SPECIFIC GOALS STATED IN THE EXERCISE, A FOURTH WITH NO EXPLICIT GOALS. EACH OF THE THREE GROUPS HAS A DIFFERENT GOAL AS FOLLOWS:

- 1) THE USER MUST NEVER FAIL TO BUILD THE OBJECT, USING THE DOCUMENTATION (RELIABILITY).
- 2) THE USER MUST BUILD THE OBJECT WITHIN FIVE MINUTES, USING THE DOCUMENTATION (PERFORMANCE).
- 3) ONCE BUILT, THE USER MUST BE ABLE TO TEAR DOWN AND STORE THE PIECES, SO THE OBJECT CAN BE REBUILT LATER (MAINTAINABILITY).

THE EXERCISE IS DESIGNED TO ALLOW THE STUDENT TO DISCOVER AND EXPERIENCE THE WAYS IN WHICH DIFFERING GOALS CAN CHANGE THE RESULTING SOFTWARE. OF COURSE, THE VIEWGRAPH PROCEDURAL DOCUMENTATION IS ANALOGOUS TO SOFTWARE (I.E. CODE). (IF A GROUP FINISHES EARLY, HAVE THEM DOCUMENT THEIR PROCEDURE ON AN ADDITIONAL VIEWGRAPH -- THEY SHOULD PRESENT LAST.)

WHAT THE STUDENTS SEE:

THE FIRST TWO PAGES ARE THE SAME, THE THIRD PAGE VARIES FOR EACH GROUP. NOTE THAT THE GOALS ARE NOT NAMED BUT THEIR PURPOSE IS STATED.

SEE ATTACHED SLIDES FOR STUDENT COPIES ...

EXTRA BLANK PAGES AT THE END ARE FOR STUDENT NOTES.

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EXERCISE (PAGE 1 - EACH GROUP HAS THIS)

DEVELOP, WITH PICTURES AND WORDS, A DESCRIPTION FOR BUILDING THE FOLLOWING SYSTEM:

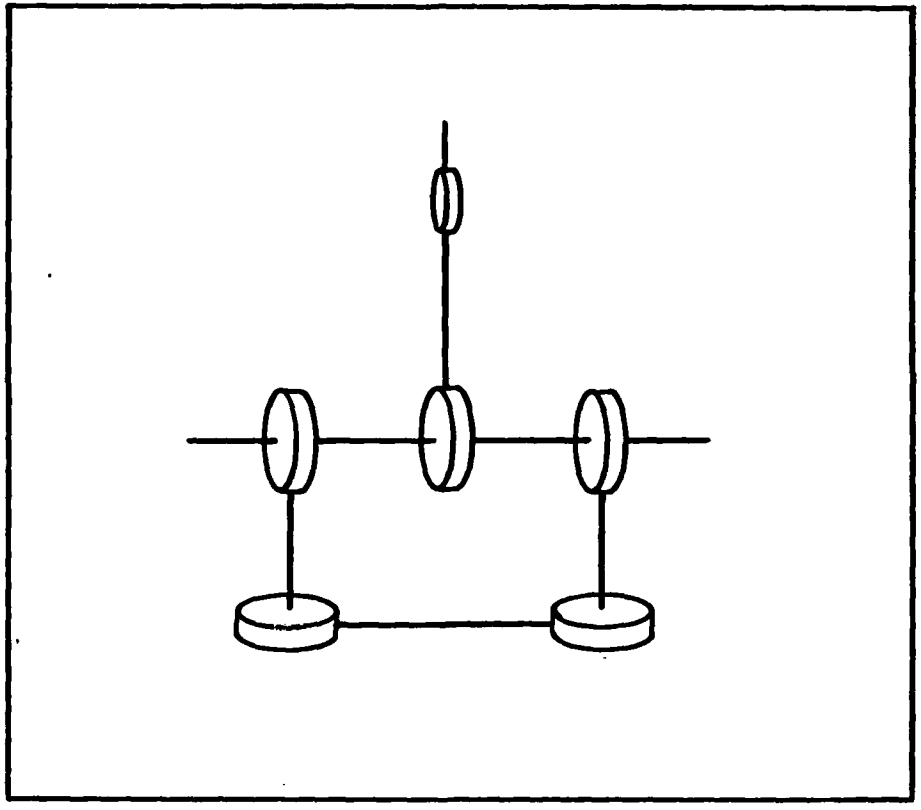


FIGURE A.

EXERCISE (PAGE 2 - EACH GROUP HAS THIS)

WITH THE FOLLOWING PARTS:

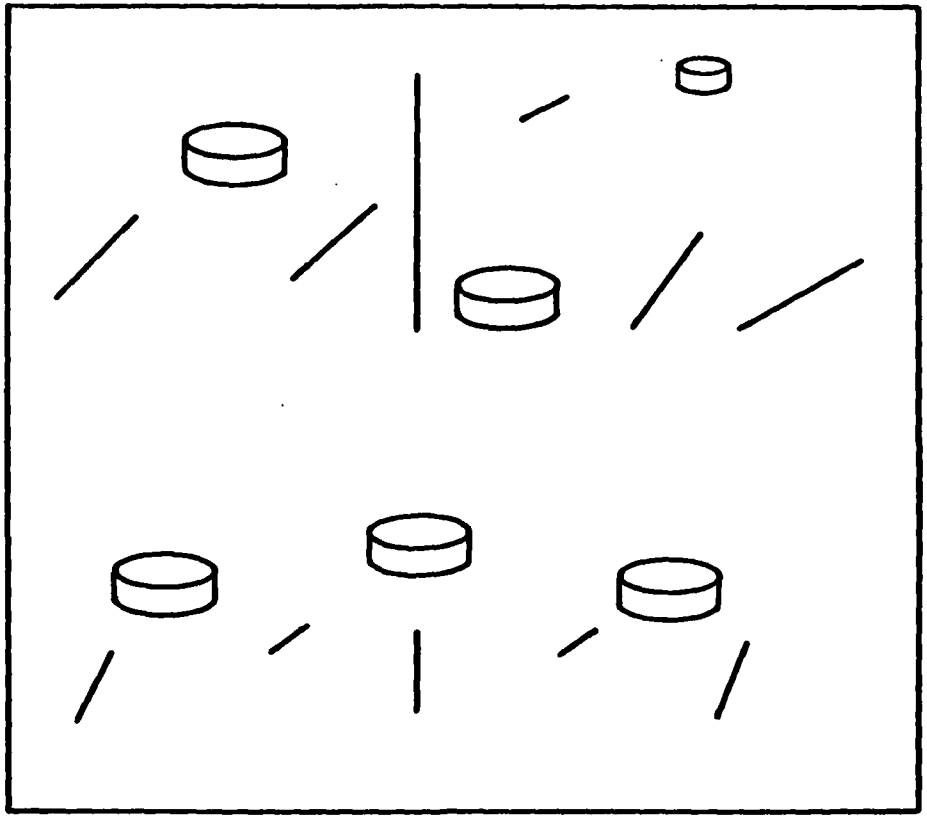


FIGURE B.

USE AS MANY VIEWGRAPHS AS YOU WISH. EACH GROUP WILL PRESENT THEIR RESULTS.

EXERCISE (PAGE 3 - ONLY GROUP A HAS THIS)

ALSO, YOUR DESCRIPTION MUST BE CLEAR ENOUGH FOR ANYONE IN THE CLASS TO BUILD THE SYSTEM FROM ITS PARTS IN 5 MINUTES.

EXERCISE (PAGE 3 - ONLY GROUP B HAS THIS)

ALSO, YOUR DESCRIPTION MUST BE CLEAR ENOUGH FOR ANYONE IN THE CLASS TO BUILD THE SYSTEM FROM ITS PARTS EVERY TIME.

EXERCISE (PAGE 3 - ONLY GROUP C HAS THIS)

ALSO, YOUR DESCRIPTION MUST BE CLEAR ENOUGH FOR ANYONE IN THE CLASS TO BUILD THE SYSTEM FROM ITS PARTS.

EXERCISE (PAGE 3 - ONLY GROUP D HAS THIS)

ALSO, YOUR DESCRIPTION MUST BE CLEAR ENOUGH FOR ANYONE IN THE CLASS TO BUILD THE SYSTEM FROM ITS PARTS AS SHOWN IN FIGURE A OR FIGURE C.

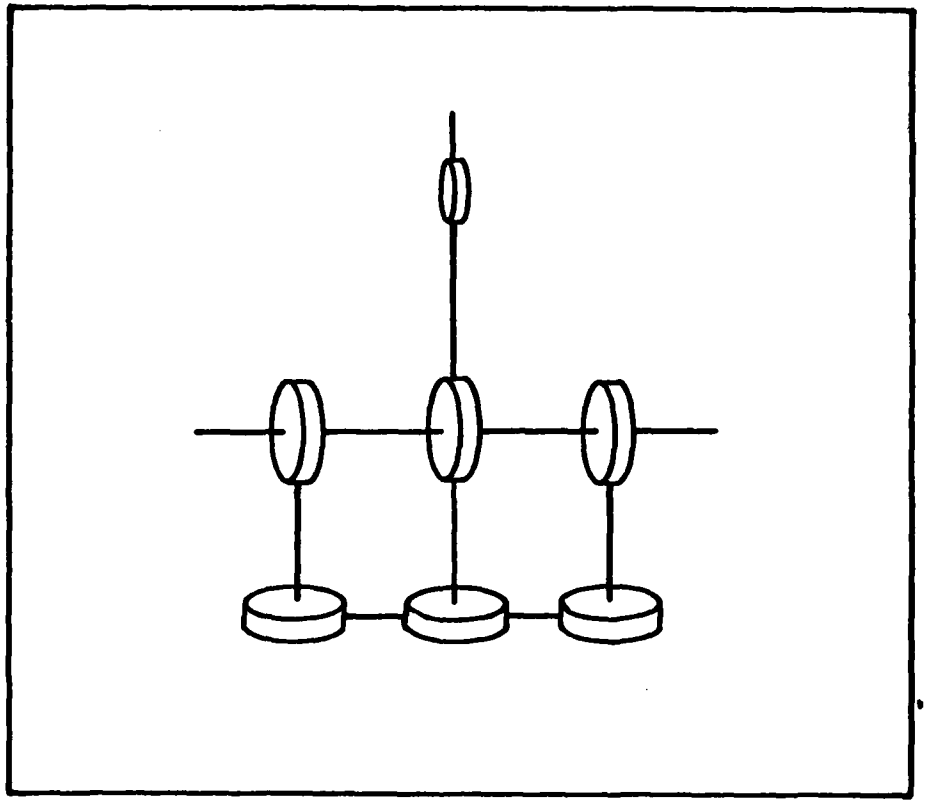


FIGURE C.

PROCEDURE:

EXERCISE IS BROKEN INTO THREE PHASES: STUDENT PREPARATION, STUDENT PRESENTATIONS, AND DISCUSSION/WRAP-UP.

ALLOW TIME AS FOLLOWS:

PREPARATION - 30-40 MINUTES
PRESENTATIONS - 20-30 MINUTES (5 MIN/GROUP)
DISCUSSION - 20-30 MINUTES

MAKE SURE THE CLASS IS NOT AWARE OF ANY DIFFERENCES IN THE EXERCISE HANDOUTS OR THE GROUPS. ALSO, DO NOT TELL THEM THE PURPOSE OF THE EXERCISE UNTIL THE DISCUSSION/WRAP-UP.

ONLY AFTER THE CLASS HAS SPLIT INTO FOUR GROUPS SHOULD THE EXERCISES BE PASSED OUT. ASK THE CLASS TO READ THE INSTRUCTIONS AND HOLD QUESTIONS UNTIL AN INSTRUCTOR GETS TO THE GROUP.

IF A GROUP IS HAVING DIFFICULTY STARTING, GIVE THEM A FEW HINTS.

POINTS TO COVER IN THE SUMMARY:

- UNDERLYING PURPOSE OF EACH GROUP
- RELATIONSHIP OF GOAL TO RESULT (I.E. THE DIFFERENCES)
- WHAT ARE SOME OF THE DIFFERENCES IN THE RESULTS
- SOME OF THE ENGINEERING PRINCIPLES WHICH MIGHT HAVE BEEN USED IN EACH GROUP

AS PART OF THE SUMMARY, THE INSTRUCTOR COULD TRY TO ELICIT THE ANSWERS TO SOME OF THE ABOVE QUESTIONS TO STIMULATE DISCUSSION. BE SURE TO SUMMARIZE AT THE END.

OBJECT ORIENTED

DESIGN EXERCISE

VG 861

INSTRUCTOR NOTES

INTRODUCE THIS AS A SMALL PART OF LARGER SYSTEM. ITS PURPOSE IS TO DEMONSTRATE THE USE OF OBJECT ORIENTED DESIGN.

REFER THEM TO OBJECT ORIENTED DESIGN SECTION STARTING AT 3-135 FOR THE METHOD TO BE USED.

EMPHASIZE THAT THERE ARE TWO TYPES OF OPERATIONS TO BE PROVIDED, SIMPLE AND TRIG.

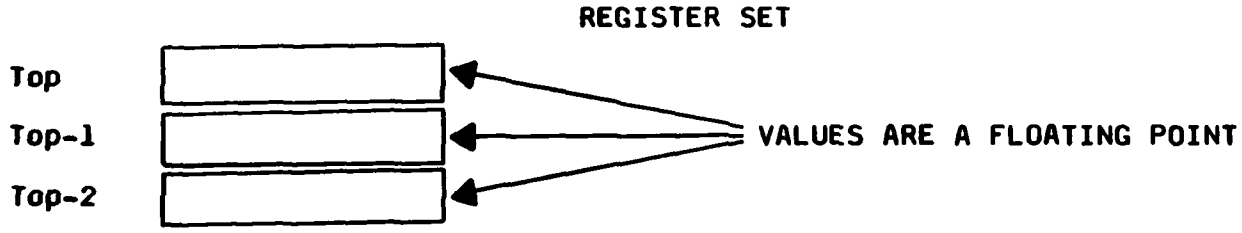
COMMENT THAT TRIG OPERANDS CAN BE EXPRESSED EITHER AS RADIANS OR DEGREES, THEIR OPTION.

THE PROBLEM

AS PART OF A LARGE SYSTEM WE NEED A CALCULATOR FUNCTION THAT HANDLES SIMPLE ARITHMETIC OPERATIONS (+, -, /, *, $\sqrt{\ }$) AND TRIG OPERATIONS (sin, cos, arctan, tan) ON FLOATING POINT OPERANDS.

(A STARTING POINT)

- BASIC CALCULATOR STRUCTURE



- OPERATION EQUATIONS

  - Top ← Top (op) Top-1 — FOR DYADICS (+, -, *, ETC)
  - Top ← (op) Top — FOR MONADICS (-, sin, ETC)

- OPERATIONS ON REGISTER SET THE USER INTERFACES

  - PUSH VALUES

    Top-2 ← Top-1
    Top-1 ← Top
    Top ← Value

  - POP VALUES

    Value ← Top
    Top ← Top-1
    Top-1 ← Top-2
    Top-2 ← 0.0

DEVELOP AN INFORMAL STRATEGY

FORMALIZE THE STRATEGY

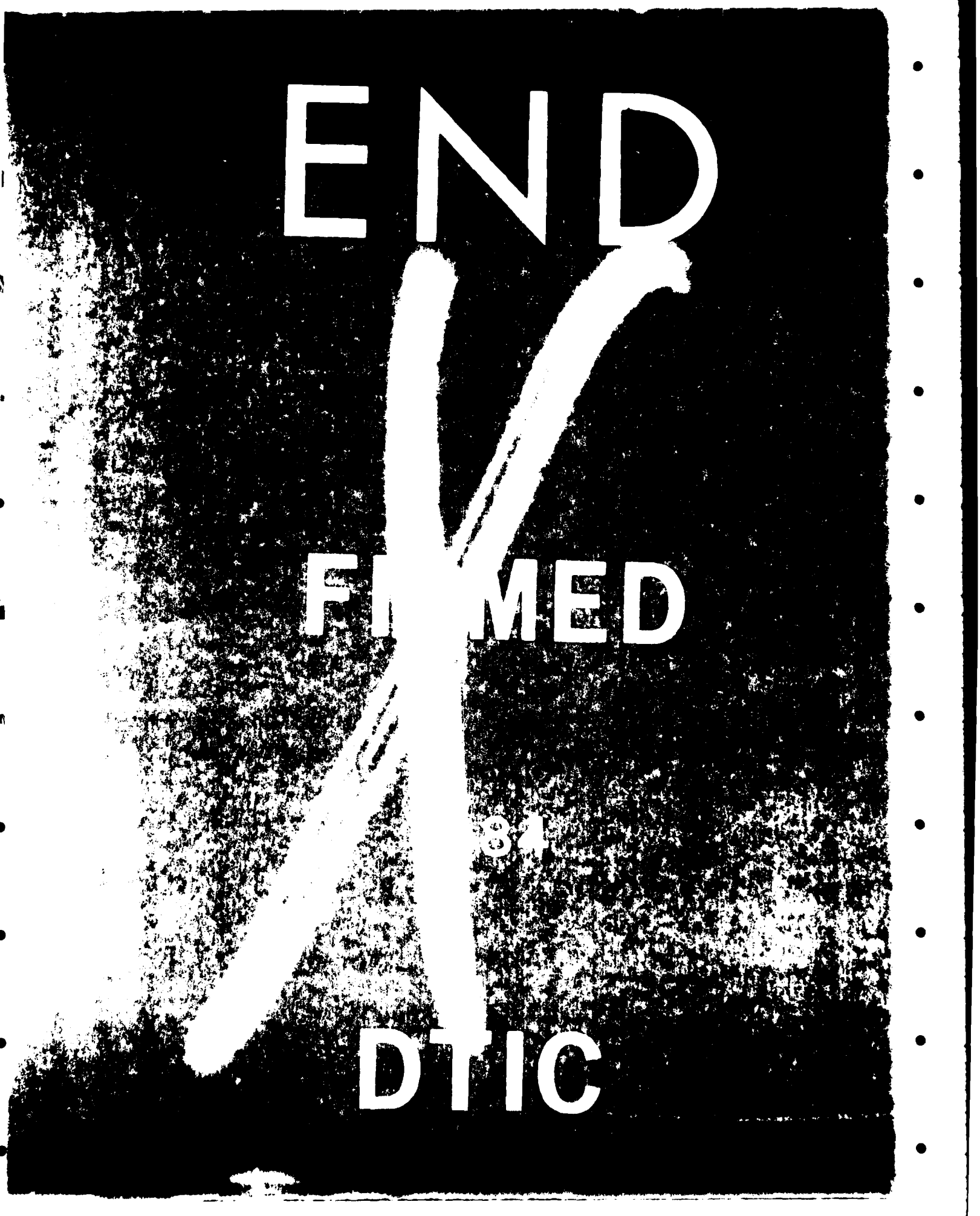
- IDENTIFY OBJECTS AND THEIR ATTRIBUTES

FORMALIZE THE STRATEGY

- IDENTIFY OPERATIONS ON THE OBJECTS

FORMALIZE THE STRATEGY

- ESTABLISH THE INTERFACES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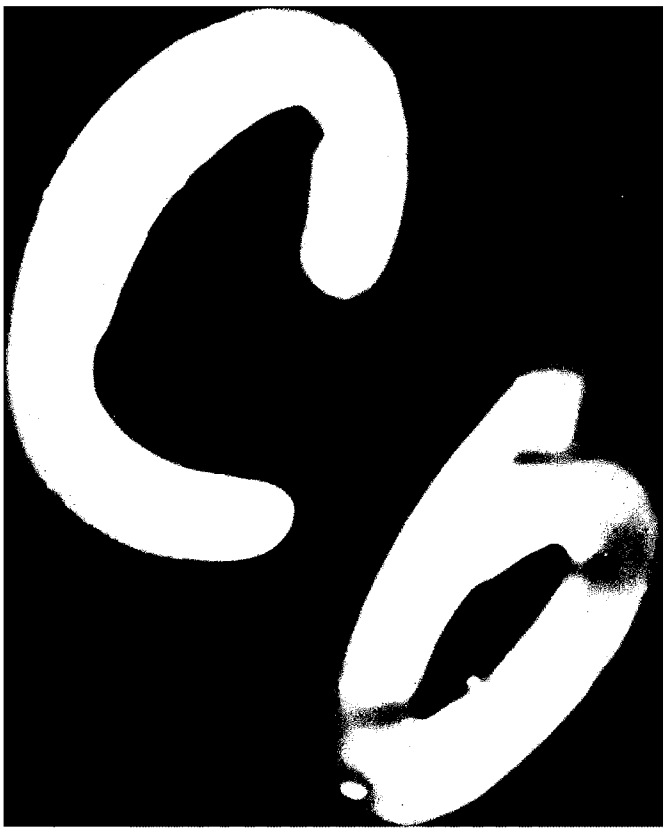

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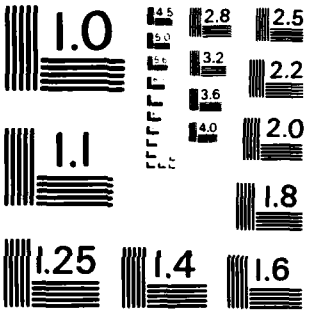

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

SUPPLEMENTARY

INFORMATION

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DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703

REPLY TO
ATTENTION OF:

15 OCT 1984

Center for Tactical Computer Systems

Ms. Madeline Crumbacker
Defense Tactical Information Center
Cameron Station
Alexandria, Virginia 22314

Dear Ms. Crumbacker:

As per phone conversation with Ms. Andrea Cappellini, CENTACS on 11 October 1984, a copyright statement has been omitted on documents sent to DTIC and NTIS. Enclosed please find the copyright statement (Encl 1) that must appear in the enclosed list of document (Encl 2). If you have any questions, please contact Ms. Cappellini at 201-544-4280.

Sincerely,

for JAMES E. SCHELL
Director, CENTACS

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